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Earnings Adjustment of Temporary Migrants*

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Abstract

The high effort of migrants to invest into human capital and the positive selective character of migration are the main explanations for the rapid decrease of the earnings gap between migrants and natives, as found in a variety of empirical studies on migration to the USA, Canada and Australia. This paper shows that in the case of temporary migration the optimal investment into country specific human capital is lower than in the case of permanent migration and may not be sufficient to allow migrants' earnings to catch up with those of native workers. Furthermore, it is shown that migration is positively selective only under certain labor market conditions. Empirical findings support the hypotheses of low human capital investment in the case of temporary migration. The results strongly suggest the need for carefully differentiating between temporary and permanent migration when investigating migrant's earnings assimilation.

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1 Introduction

In the last decade the labor market adjustment of immigrants and the speed of adjustment of their wages to the level of the respective native worker has been of growing interest to economists. Following Chiswick's (1978) seminal article, most contributions applied some extended version of the human capital earnings function as developed by Mincer (1974) to cross-sectional data. Testing the hypotheses of imperfect international transferability of skills and the resulting consequences, and self-selection of migrants, the focus of interest of these studies has been variables that explain earning differences between migrants and native workers. Empirical evidence concerning these questions has been presented for various countries as well as for male and female subgroups.[1] The results indicate that the initial income gap between native and foreign workers narrows the longer the migrant stays. This narrowing is a consequence of country-specific human capital investment by immigrants, other things remaining equal. Furthermore, for some countries immigrant earnings have even overtaken the earnings of comparable native workers after some time.[2] Therefore, empirical findings seem to indicate that migrants succeed in compensating for their initial earnings disadvantage by considerable investment effort into country-specific human capital and, furthermore, that migrants are a self-selected group, having a higher ability and motivation than the average native worker.

However, the kind of migration examined in the above mentioned studies was permanent, favoring country-specific human capital investment, and, moreover, the migrant was confronted with highly competitive labor markets, favoring selective migration. Therefore, the questions arise whether these results remain valid for temporary migration and where labor is not only "pulled" by a favorable labor market situation in the host country, but also "pushed" by highly unfavorable conditions in the source country.

This paper will try to answer these questions. In particular, the assimilation of guest workers to labor market conditions in West Germany and the impact of the assimilation process on the earnings differential between guest workers and German nationals will be examined, pointing out differences between guest worker migration and migration that has a more permanent character.[3]

[1] See, for example, Chiswick (1978), Tandon (1978), Long (1980), Chiswick and Miller (1985) and Meng 1987

[2] Chiswick (1978) found that earnings of migrants in the American labor market exceed earnings of native-born men with same characteristics after 10-15 years.

[3] In this paper, the terms *temporary migrants* and *guest workers* are used interchangeably.

Post-war labor inmigration into West Germany started in the mid 50's and accelerated rapidly until 1973. The percentage of foreigners employed in the labor force increased from 0.6% in 1957 to 11.2% in 1973, the highest percentage of foreign workers ever employed in West Germany, and declined thereafter.[4] This heavy inmigration of laborers mainly from Southern European countries was caused by the rapid economic development in West Germany after the second world war and the resulting growing excess demand for labor. It was supported by high unemployment rates and low per capita incomes in the countries of origin. The growing inflow of foreign workers into the German labor market was accompanied by a number of measures regulating legal, social and labor market conditions. The fear of the unions that foreign labor might be used by employers to keep wages down, the interest of employers in encouraging recruitment of foreign workers, as well as the effort of source country governments to sustain equal rights for their citizens in the host countries were largely responsible for a number of agreements that virtually accorded equal treatment of guest workers in the German labor market and within the social security system. Furthermore, in the 60's recruitment agreements were concluded between Germany and all the main source countries which considerably facilitated migration for the worker by guaranteeing him a one year contract upon arrival, accommodation and payment of travel expenses. Moreover, he could not be dismissed during the first year of residence.[5] Recruitment activities stopped in 1973, the turning point of the strong economic boom in Germany.

Accordingly, the situation of guest workers coming to Germany was characterized by low costs of migration and high rates of return resulting from the considerable economic differences between most source countries and the host country; in addition, the duration of stay was expected to be temporary both by the governments concerned and by the guest worker himself, thus providing a lower incentive to invest into country-specific human capital as is the case with permanent migration. Consequently, one would expect to find migration to West-Germany to be less selective and the effort of the migrant to invest into country-specific human capital to be low.

The organization of this paper is as follows: Section 2 develops the theoretical framework and points out the implications emerging from the special character of temporary migration and the consequences for empirical work. Section 3 discusses the data and the different empirical specifications to be estimated and presents the empirical results. Besides an analysis of factors causing earning differentials between natives and guestworkers based on a pooled dataset of both subsamples, the hypothesis will be tested that the expected length of stay influences earnings positively by way of

[4] Bundesanstalt für Arbeit, Arbeitsstatistik 1974

[5] Mehrlaender (1980), pp. 81, 82

country-specific human capital investment. Finally, the various earnings potentials of guest workers with different nationalities will be distinguished. The main results will then be summarized in Section 4.

2 Theoretical Framework And Implications

2.1 Country-Specific Human Capital Investment and the Duration of Stay

The empirical literature on the speed of adjustment of immigrants to the labor market conditions of the country of immigration takes as a point of departure the human capital earnings function, as initiated by Becker and Chiswick (1966) and further developed by Mincer (1974).

An important characteristic of the human capital approach is the explanation of income differences by way of different individual investment in human capital. The basic human capital function, commonly known as the "schooling model", explains differences in labor incomes in terms of differences in the amount of schooling. Extensions of this simple model include post-school investments as a further main determinant for the explanation of wage differences. When analyzing earnings functions of immigrants, this equation is usually extended by a variable that measures the migrant's duration of residence in the host country. The underlying assumption of this formulation is that during his stay in the host country the migrant accumulates country-specific human capital. Therefore, holding other variables constant, the time spent in the host country is expected to positively influence the income of migrants.

In what follows the conventional human capital equation will be developed and extended to include the specific human capital accumulation of immigrants. Both the theoretical derivation and the final extended human capital equation will illuminate the importance of the length of the period the migrant expects to stay for his effort to invest into country-specific human capital.

According to Mincer (1974), it should be assumed that after leaving school the worker continues to devote a certain amount of his resources to furthering skills or acquiring job related knowledge. Measurable earnings or net earnings are then the difference between the workers earnings potential, or gross earnings, and the cost of investment into human capital in that period.[6] Given a finite working life and ne-

[6]The cost of investment into human capital is best understood in terms of opportunity costs. If the "full income" of a worker is equal to the time he is able and willing to devote to working activities,

glecting depreciation of human capital, the optimal amount of investment will decline over time. Since the size of earnings in any period depends on investment activities in previous periods, earnings will depend on the length of the period the worker has been in the labor force. Accordingly, working experience will explain earning differences among otherwise identical workers.

In the case of immigrants, however, a second factor has to be considered. Since the human capital the migrant accumulated in his home country is only partially transferable to the foreign labor market, not only will the above explained investment into human capital continue, but, furthermore, the migrant will transfer country of origin specific human capital into host-country specific human capital and will adapt host-country specific knowledge. Assuming that these investments are costly, at least in terms of foregone earnings, the size of assimilation effort depends on the time the worker intends to stay in the host country. Thus, the duration of residence in the immigration country as well as the expected total length of stay will help to explain income differences between otherwise identical migrants.

According to the above considerations, and using a continuous notation, the instantaneous change in gross income of migrant i, $\dot{E}_i$, can be written as a first-order differential equation with variable coefficient:

$$\dot{E}_i = [r_i k_{it} + \varrho_i \mu_{it}] E_{it} \tag{1}$$

where E_{it} are gross earnings of migrant i in period t, r_i is the rate of return on investment in job-specific human capital and ϱ_i is the rate of return on the migrant's efforts in transferring human capital corresponding to the needs of the host-country labor market and the acquirement of host-country specific knowledge.[7] k_{it} and μ_{it} are the fractions of the earnings potential devoted to human capital investment, either by furthering job specific skills or by transferring human capital and acquiring country-specific skills, respectively.[8] Solving equation (1) results in the following expression:

$$E_{it} = E_i^I e^{r_i \int_0^{I_i} k_{it}\, dt + \varrho_i \int_0^{I_i} \mu_{it}\, dt} \tag{2}$$

where E_i^I is the migrant's potential gross-income upon arrival in the host country and I_i his length of residence. The gross income of a migrant in a certain period thus

weighted with the wage rate that corresponds to worker's human capital, then the measured income equals the full income minus the value of time spent for investment activities.

[7] For simplification, the rates of return on investment into work-related human capital, r_i, and country-related human capital, ϱ_i, are assumed to be constant over time.

[8] Let C_t be migrant's investment into job-related human capital and K_t his investment into country-specific human capital. Then $k_t = \frac{K_t}{E_t}$ and $\mu_t = \frac{C_t}{E_t}$.

depends on the gross income potential he accumulated before migration and investment into job-specific skills after migration as well as on his effort to acquire country-specific knowledge and to transfer skills.[9] Following the above procedure, E_i^I can be expressed as follows:

$$E_i^I = E_i^s e^{r_i \int_0^{L_i} k_{it}\, dt} \tag{3}$$

L_i is the length of migrant's working experience in the home country and E_i^s is his potential income after S years of schooling. Assuming that gross earnings without any schooling and training are equal to E^0, and further assuming that during school years all available time will be devoted to schooling, it follows:

$$E_i^s = E_i^0 e^{r_i^s S_i} \tag{4}$$

where r_i^s is the rate of return to schooling. Combining (2), (3) and (4) and taking logarithms:[10]

$$E_{it} = lnE_i^0 + r_i^s S_i + r_i \int_0^{\tau_i} k_{it}\, dt + \varrho_i \int_0^{I_i} \mu_{it}\, dt \tag{5}$$

τ_i is the total amount of working experience: $\tau_i = L_i + I_i$. The above equation cannot be used for empirical application because the ratios of potential total income devoted to human capital investment in any period t, k_{it} and μ_{it}, and the potential income E_{it} are not observable. Measurable income is net income, the difference between potential income and the fraction of potential income the worker sacrifices in order to further his abilities. Gross income will therefore be replaced by net income using

$$lnE_{it} = lnY_{it} - ln(1 - k_{it} - \mu_{it}) \tag{6}$$

To make (5) applicable for empirical purposes, a specific form of the investment functions has further to be specified. Assuming that the fraction of earnings capacity which is invested declines linearly during working life and duration of stay, so that

$$k_{it} = k_{i0}(1 - \frac{j}{T_i}) \tag{7-a}$$

[9](2) implies the simplifying assumption that the migrant is in the work force since immigration to the host country.

[10]Note that (5) implies that the rate of return on job-specific human capital investment, r_i, is equal for investments undertaken in the country of origin and in the home country. Any differences in the rate of return of human capital investment in the home country therefore enters into ϱ_i.

$$\mu_{it} = \mu_{i0}(1 - \frac{h}{\theta_i}) \qquad (7\text{-b})$$

where k_{i0} and μ_{i0} are the ratios of post-school investment to potential income after leaving school and of host-country specific human capital investment to potential income upon entering the host-country, respectively. T_i is the length of working life and θ_i the amount of years the guest worker intends to stay in the host country. j and h are time indices. Either investment ceases if $j = T_i$ or $h = \theta_i$. Note that the fraction of the migrants earnings potential invested into human capital accumulation at any t depends crucially on the expected length of stay θ. Accordingly, the expected length of stay should explain earnings differences between otherwise identical migrants.

Inserting (6), (7-a) and (7-b) into (5), solving the integrals and rearranging terms results in the following expression:

$$lnY_{it} = lnE_i^0 + ln(1 - k_{it} - \mu_{it}) + r_i^s S_i + r_i k_{i0} \tau_i - \frac{r_i k_{i0}}{2T_i} \tau_i^2 + \varrho_i \mu_{i0} I_i - \frac{\varrho_i \mu_{i0}}{2\theta_i} I_i^2 \qquad (8)$$

Assuming the values of k_0, μ_0, r_s, r and ρ as constant among individuals, (8) indicates that differences in migrants' earnings are explained by different schooling backgrounds and different working experiences as well as varying durations of residence in the host country. Furthermore, the theoretical derivation above suggests that the form of the investment profile of migrant workers and thus their earnings at any t depends on the migrants expected total duration of stay, θ_i. This variable is neglected in all studies that investigate the assimilation of the earnings of migrant workers. In the case of permanent migration, θ may not help too much to explain differences among migrants' earnings. However, if θ varies considerably among individual migrants as it is the case with temporary migration, this variable may explain a significant part of earnings differences among migrant workers. (8) indicates that, everything else being equal, the longer the migrant expects to stay in the host country, the less concave is his earnings profile.

Therefore, the steepness of earnings profiles may vary among otherwise identical temporary migrants if they have different expectations about how long to stay in the host country.

Furthermore, the generally shorter time horizon of migration history in case of temporary migration if compared with permanent migration suggests that temporary migrant's earnings profiles should have a lower pattern, resulting from a lower investment effort into country specific human capital.[11]

[11]The above formulation assumes that after retirement or return to the home country any former

2.2 Selective Migration

The second hypothesis to explain the strong position of permanent migrants in the American, Australian and Canadian labor market is, beside a considerable effort to invest into country-specific human capital, a positive self-selection of migrants. Arguing that the rate of return is higher for a high-ability person than for a low-ability person, migration is self-selective.

The underlying assumption of the selective migration hypothesis is that migrants are fully employed in both labor markets. If, however, the labor market of the emigration country is characterized by high unemployment that affects low-ability workers to a higher extent than high-ability workers, and if in the immigration country there is an excess demand for labor, migration may even be selective in a negative sense.

This can easily be shown by reconsidering and extending Chiswick's (1986) theoretical argument of positive selective migration. Under the simplifying assumptions that earnings do not vary with experience, work life is long and migration costs are incurred only in the initial period, the rate of return to the migration decision for a person with ability stock k is, according to Chiswick, given by

$$r = \frac{(w^H - w^s)(1+k)}{(1+k)\,c^O + c^D} = \frac{w^H - w^S}{c^O + \frac{1}{1+k}c^D} \tag{9}$$

where w^H and w^S are earnings in host- and source country, respectively, c^O are opportunity (time) costs and c^D direct costs of migration. (9) assumes that a person with ability level $k > 0$ has earnings $k\%$ higher in both countries than a person with ability level $k = 0$. Since c^O are the time costs of migration, these costs increase with the ability level. It is obvious from (9), that, for $c^D > 0$, the rate of return is higher the higher the ability level. Chiswick then concludes that the incentive to migrate is higher for high-ability persons. If abilities are similarly distributed among countries, immigrants will consequently have, on average, a higher level of abilities than native workers. The selection process will be more intense the larger the direct costs of migration, c^D.

Chiswicks argument, however, is only true if certain labor market conditions are fulfilled. Assume an excess demand for labor in the host country and an excess supply

investment into country-specific human capital will be of no further use. This is a reasonable assumption in case of temporary migration. However, wage-effective country specific human capital investments like learning the foreign language may well be of further use to the permanent migrant even after retirement. Accordingly, for some investments the pay-off period will be longer for the permanent migrant, even if both work in the host country over the same total period length.

for labor in the source country. In the case of temporary migration, host- and source country are often characterized by such labor market situations. Migration is often induced by a temporary excess demand for unskilled or semiskilled labor in the host country. The labor attracted stems from countries with significantly poorer economic conditions and, very often, an excess supply for labor in the low-skilled labor market.

Assume further that in the source country a high ability worker will more easily find a job than a low ability worker. Let $p(k)$ be the probability that a worker with ability level k is employed in the source country, with $p'(k) > 0, p(0) = 0$, and let b denote an unemployment benefit in the source country. Adopting Chiswick's notation, the rate of return on the migration decision to a worker with ability level k can then be written as:[12]

$$r = \frac{w^H - [w^S p(k) + (1 - p(k))b]}{c^0 + \frac{1}{1+k} c^D} \tag{10}$$

For $w^S > b$, the gain of migration will be lower the higher the ability level of the migrant. Therefore, for some probability distribution $p(k)$, some ability distribution and some set of values for earnings, costs and unemployment benefits the rate of return could well be highest at very low ability levels.[13] In that case, it would be more profitable for the less able workers to migrate: migration would accordingly be negatively rather than positively selective. Furthermore, the benefit of migration to a migrant with ability level k will be higher the lower the unemployment benefit b. Low direct costs of migration will support the migration decision of those with lower levels of abilities.

Although the arguments are extremely simple, the above considerations make clear that the kind of the selection process taking place strongly depends on the economic situation and the labor market conditions in both, the host- and the source country. In terms of the above analysis, the degree and the sign of selectivity depends on the distribution of abilities in both, host- and source country, and the correlation between unemployment and ability level in the source country. If the rate of return of migration were highest for an ability level k^*, with k^* smaller than the average ability level in the host country, migration would tend to be negative selective.

[12] Since c^O are time costs of migration, they will as well depend on $p(k)$. Assuming c^O as constant does not change the intuition of the argument and simplifies matters.

[13] Let abilities be normally distributed in the source country, with mean $\bar{k} = 2$ and variance $\sigma = 1$: $f(k) \sim N(2, 1)$. Furthermore, let the probability that a person with ability level k is employed be equal to the cumulative distribution: $p(k) = F(k)$. If $b = 0$ and, for instance, $w^H = c^O = 10$, $w^S = 5$, $c^D = 1$, the rate of return will be highest for an ability level $k = 0$. One can easily verify that similar results will hold for other values of wages and costs.

In the case of West Germany, there was an excess demand for labor during the period of highest in-migration, while the labor market conditions in all emigration countries were characterized by high unemployment rates. Furthermore, the costs of migration were kept fairly low by a variety of agreements, as a result of the interest of German employers in attracting foreign workers. Therefore, according to the above considerations, migration to West-Germany may have been non-selective or even negative selective.

To summarize, the above considerations suggest that earnings profiles of temporary migrants are lower than those of permanent migrants, resulting firstly from a shorter pay-off period of temporary migrants for any country-specific human capital investment. Lower investment effort is then a result of free choice, based on optimizing behavior. Secondly, the generally assumed positive selection process is found to be strongly dependent on the economic situations of host- and source country. The argument is then that in the case of temporary migration economic circumstances may favor non-selective or even negative selective migration rather than positive selective migration.[14]

In what follows, the hypotheses of lower earnings profiles of temporary migrants compared with those of permanent migrants will be tested, using native workers as a reference group. Since in other contributions that have investigated the earnings adjustment of permanent migrants it has been found that the earnings gap between natives and migrants narrows over time, similar results here would reject the above hypotheses. To specify whether the earnings advantages or disadvantages of foreign workers relative to native workers are due to any selection process or depend on the time horizon the migrant considers as pay-off period of his human capital investment, additional tests will be carried out. Using interview data on the expected length of stay, it will be tested whether a longer expected total duration of stay in the host country positively influences country-specific human capital investment and, accordingly, migrant's earnings. Arguing that the migration history of permanent migrants will be longer than that of temporary migrants, any significant results would then allow to infer on the length of migration history as a crucial characteristic that distinguishes

[14]Note an important difference between the two arguments that favor a lower earnings pattern: While the degree of self selection implies a restriction on the average migrant to relatively improve his earnings position, low investments as a result of a short expected migration history are a free-choice decision.

TABLE 1:
Country of Origin, Shares in the Foreign Sub-Sample

Country	(%)
Turkey	30.1
Italy	22.7
Jugoslavia	19.8
Greece	13.9
Spain	13.5
$\sum$	100.0

SOURCE: Socio-Economic Panel, wave 1, 1984

the earnings adjustment of temporary and permanent migrants.

Furthermore, the rate of return on human capital investment should be higher for those who immigrate with a stock of human capital that is easily transferable to the needs of the host country. Assuming that these differences are correlated with the country of origin, this hypotheses will be tested, using the subset for immigrants only.

3 Estimation of Earnings Equations

3.1 Data and Sample Characteristics

The empirical analysis below uses as a data base the first wave of the German socio-economic panel, collected in 1984. The panel is a longitudinal cross-sectional sample on a household base, where besides asking about characteristics specific to the household, all people above 16 years were personally interviewed. The total sample of the first wave consists of 6000 households which can be subdivided into two subsamples, according to the nationality of the head of the household. The subsample with a German household head comprises 4500 households, whilst that with a household head of Turkish, Spanish, Jugoslavian, Greek or Italian nationality comprises 1500 households. This subsample is over represented in the total sample in order to provide a sufficient database for an empirical analysis.

The data used for this study is restricted to men of foreign and German nationality, above the age of 16 in 1984, who were fully employed at the time of the interview. To

TABLE 2:

Sample Characteristics of Native-Born and Foreign-Born males, 1984

	Native Born		*Foreign Born*	
	Mean	SD	Mean	SD
Earnings (DM)	3456	1718	2733	1005
Log of Earnings	8.06	0.40	7.86	0.29
Age	40.36	11.29	39.36	10.73
Years of Schooling[a]	2.29	3.54	1.22	2.54
Years of Training	3.05	2.46	1.34	2.28
Years of Working Experience	19.72	11.78	19.87	10.68
Married (%)	75.68	42.90	85.45	35.27
Years since Migration	*	*	15.16	6.78
Language satisfactory (%)	*	*	38.40	48.65
Language good or very good (%)	*	*	45.45	49.77
Sample Size	2414		1052	

SOURCE: Socio-Economic Panel, wave 1, 1984

[a] After the age of 14.

guarantee comparability, self-employed persons and state employees are excluded from the analysis. The latter group had to be removed from the sample since people with non German nationality are usually not allowed to become state employees. The final sample is then reduced to 2414 persons with German nationality and 1052 persons with foreign nationality. Table (1) reports the summary statistics on the nationalities of the subsample for immigrants.

Table (2) compares some economic and socio-economic characteristics of German nationals and immigrants with foreign nationality. The average gross-earnings, reported as earnings in the month preceding the interview, are 21% higher for German nationals compared with foreign workers. This substantial absolute income difference might be partially explained by the different schooling backgrounds of the two groups. From the sample information two different variables on the educational background can be extracted. Both refer to the level of education received after the age of 14.[15] The variable Schooling (SCH) measures the years spent in school, evening school or at university, while the variable Training (TRAIN) measures the years of job-specific

[15] The empirical analysis below therefore assumes an equal schooling background for all persons before the age of 15. A further differentiation of education and schooling was not possible since the data had to be constructed using a biographical scheme that lists life activities after the age of 14.

TABLE 3:

Expected length of stay and total length of stay of Foreign-Born males, 1984

Interval (in years)	≤ 1	$1 < x \leq 5$	$5 < x \leq 10$	$10 < x \leq 20$	$20 < x \leq 30$	> 30
YSM (in %)	0.23	5.8	8.5	70.00	15.00	0.47
ESTAY (in%)	5.98	31.08	22.62	7.79	0.57	31.94[a]
TOTSTAY (in%)	0.00	0.38	3.42	28.61	28.13	39.44

SOURCE: Socio-Economic Panel, wave 1, 1984

[a]98.98% of this number intend to stay forever.

education and apprenticeship. The average amount of years of both forms of educational input is considerably higher for natives than for foreign nationals. Both groups have approximately the same average age and working experience (EXP), with working experience measured as the amount of years a person was fully employed. A higher percentage of foreign nationals in the sample were married. A relatively high percentage of guest workers claimed to have at least a satisfactory knowledge of the German language, even though none of the countries of origin uses German as a main language. The average amount of years since migration is fairly high, indicating that most of the guest workers immigrated before 1973, the year when immigration was restricted.

Subdivided into 6 time intervals, Table (3) reports statistics on the percentage of migrants that fall into the respective sub category on the years they have already spent in Germany, YSM, the length of time they expect to further remain in Germany, $ESTAY$, and the total length of stay, $TOTSTAY$. Specifically, the numbers for the construction of the variable $ESTAY$ are based on interviews which asked foreign nationals how long they further expect to stay in Germany. Possible answers were *forever* or a specific number of years. $TOTSTAY$ is then calculated by simply adding the amount of years the migrant intends to stay in future and the number of years since migration.

The first row of table (3) indicates that more than 85% of migrants in the sample have been in Germany for more than 10 years. The numbers in the second row reveal that, while nearly one third of the migrants intend to stay more than 30 years or forever, more than half of them intend to return to their home countries within the next ten years. The numbers reveal, furthermore, that of the migrant population living in Germany less than one third intend to change the temporary status into permanent status, even though the expected total length of stay of more than 90% of guest workers is higher than 10 years. One could expect that from those who do want

to return to their home countries a high percentage will retire in Germany and return after retirement. This is, however, not the case. From those who do not expect to stay forever in Germany (68% of the whole sample population) only 3.9% want to return after the age of 64.[16] This implies that the vast majority of migrants in Germany will have to either try to find employment in their home country, live on savings or become self-employed after return.

3.2 A Comparative Analysis of Earnings of German and Foreign Nationals

Different empirical specifications of equation (8) will be used for estimation, using data on natives, on foreign nationals and a pooled data set. In this section the hypothesis will be tested whether, as found for other countries, the earnings of guest workers in Germany do catch up with those of German nationals. The assumption of previous studies will be adopted that, even if two otherwise identical migrants differ in their expected duration of stay, their experience-earnings profiles are the same, i.e. $\theta_i = \theta$ $\forall i$. This restriction will then be relaxed in section 3.3.

Table (4) reports estimation results using data on German natives (column (1)) and a pooled data set of both, foreign nationals and natives (column (2)-(5)). The coefficients presented in column (1) emerge from a regression of the natural logarithm of monthly earnings on the exogenous variables labor market experience (EXP), labor market experience squared ($EXPSQ$), marital status (M), years of schooling (SCH) and job-specific education ($TRAIN$). The regression equation used to produce the coefficients in column (2) is extended by a dummy variable (FOR) that is 1 for foreign nationals and by the variables years since migration and years since migration squared, (YSM) and ($YSMSQ$), respectively. These variables are zero for natives. The equations presented in column (3) -(5) additionally allow for varying parameters of the experience variables and the schooling variables between natives and foreign nationals, and introduce dummy variables on language abilities, where L_2 stand for satisfactory knowledge of the German language and L_3 for good or very good knowledge in German.

Except for the schooling variables, the results using the native subsample (column (1)) are quite similar to those found for natives in other countries. All coefficients have the expected sign and are significantly different from zero. Working experience has a positive impact on incomes of natives, but with a decreasing rate. Evaluated at 5 years of experience, an extra year of being in the labor force increases earnings of

[16] 11.78% will be older than 60 at the point of expected return.

TABLE 4: Regression Analysis of Earnings of Foreign and German Nationals (Dependent Variable: Natural Logarithm of Monthly Earnings)

var	(1)	(2)	(3)	(4)	(5)
constant	7.44	7.49	7.47	7.45	7.35
	(308.78)	(338.59)	(314.56)	(303.04)	(179.59)
EXP	0.035	0.031	0.034	0.034	0.034
	(14.50)	(14.91)	(13.64)	(13.82)	(13.78)
EXPSQ	-0.00070	-0.00062	-0.00067	-0.00067	-0.00066
	(-12.54)	(-12.90)	(-11.51)	(11.52)	(-11.51)
SCH	0.043	0.038	0.039	0.043	0.043
	(20.68)	(20.34)	(20.25)	(20.52)	(20.53)
TRAIN	0.022	0.021	0.020	0.023	0.023
	(7.70)	(8.56)	(8.28)	(7.78)	(7.78)
M	0.160	0.160	0.162	0.16	0.160
	(8.84)	(9.94)	(9.91)	(9.97)	(10.08)
FOR		-0.177	-0.125	-0.045	-0.0038
		(-4.28)	(-2.54)	(-0.85)	(-0.07)
FOR*YSM		0.0024	0.0066	0.0085	0.0068
		(0.74)	(1.77)	(2.27)	(1.79)
FOR*YSMSQ		-0.000016	-0.000067	-0.000089	-0.000075
		(-0.34)	(-1.31)	(-1.74)	(-1.46)
FOR*EXP			-0.009	-0.014	-0.013
			(-2.16)	(-3.11)	(-3.02)
FOR*EXPSQ			0.00016	0.00021	0.00023
			(1.61)	(2.15)	(2.30)
FOR*SCH				-0.025	-0.025
				(-5.03)	(-5.17)
FOR*TRAIN				-0.0058	-0.0066
				(-1.03)	(-1.16)
FOR*L_2					0.044
					(1.38)
FOR*L_3					0.090
					(2.76)
ADJ. R^2	0.26	0.25	0.25	0.26	0.25
No. of Obs.	2414	3466	3466	3466	3466

SOURCE: Socio-Economic Panel, wave 1, 1984

Note: t-ratios in parenthesis. Regression results presented in column (1) are generated using the data set on German nationals only; results in column (2)-(5) are based on a pooled data set of natives and foreign nationals.

natives by 2.8%. However, after 15 years of working experience the positive impact of an additional year of experience has been reduced to 1.4%. The impact of schooling and job-specific education on earnings of natives are quite different; while an extra year of job-specific education raises income by 2.2%, the impact of an additional year of after-elementary schooling is considerably greater (4.3%). However, the coefficient of the schooling variable is considerably smaller than those found for other countries.[17] Married men have incomes 16% higher than non-married men, a fact that is often explained in the literature by a more stable lifestyle of those being married.

Column (2) reports results emerging from using the pooled data set. The coefficient on the variable for foreign nationality (FOR) indicates that, holding experience and education constant, the earnings of foreign nationals are 17.7% lower than earnings of German nationals.[18] The considerably poorer educational background of guestworkers is therefore responsible for only a small narrowing of the income gap, compared with the overall income difference of 21% (Table 2).[19] Coefficients on the variables YSM and $YSMSQ$ have the expected sign, but are not significant.[20] These results indicate that the duration of stay in the host country does not have a narrowing impact on the income gap between German nationals and guest workers. However, allowing for varying parameters on the experience variable between the two groups slightly increases size and significance of the YSM-coefficient (see results in column (3)), thus indicating that YSM does not generally narrow the income gap between German and foreign nationals but has a decreasing impact on the working experience disadvantage of foreign nationals in the German labor market. Although each year of further residence narrows the income gap between the two groups, a year of working experience increases earnings of German nationals more than that of foreign nationals. Migrants do invest into country-specific human capital, but the increasing impact of their overall investment on earnings is lower than that of native workers.

To further differentiate income differences among the two groups, the coefficients of the educational variables are allowed to vary between foreign and German nationals

[17]Chiswick and Miller (1985) report that an additional year of schooling increases incomes of Australian natives by 8.2%; the impact of an additional year of schooling on earnings found for American natives is 7.2% (Chiswick, 1978), that for Canadian natives 7.1% (Tandon, 1978)

[18]Note that the coefficients of variables that are zero for natives measure the differential effect of that variable on migrant's earnings, relative to native's earnings. The absolute impact of those variables on migrants earnings are discussed in section 3.3, using the subset of migrants only.

[19]Results in column (2), table(4), do not control for the quality of schooling and training received. However, allowing for variations in the schooling and training coefficients by introducing dummies that are respectively 1 if training or schooling was done in Germany yielded insignificant results.

[20]The null hypothesis of the coefficients of YSM and $YSMSQ$ being jointly equal to zero could not be rejected at the 10% level of significance.

and additional variables on language abilities are added. Results are given in columns (4) and (5) of table (4). Evaluated at, for instance, 10 years of working experience and 5 years of residency in Germany, these numbers indicate that an additional year of residency will increase the income gap between German nationals and foreign nationals by 0.22% (column (4)). The widening impact of residency on the income gap rises to 0.47% for those with a poor knowledge of the German language (column (5)).

Accordingly, there is no earnings crossover and no narrowing impact of the duration of residence on the income gap between employed guestworkers and German nationals as found in other empirical studies on migrant's earnings. Guest workers do accumulate country-specific human capital, but investments are not sufficient to catch up with native earnings.

The effect of an additional year of schooling of foreign citizens on monthly earnings is significantly lower than for German nationals. The difference of nearly 50% is certainly due to the fact that schooling mainly took place in the home countries and is therefore of small value in the German labor market. The difference of the impact of job specific education is not statistically significant, suggesting that this investment into human capital was done predominantly in the host country or that it is highly transferable to the needs of the host country.

Furthermore, having a good or very good knowledge of the German language narrows the income gap considerably (9%).[21] The coefficient of the variable for satisfactory language ability, L_2, though having the expected sign, is not statistically significant, indicating that, in order to catch up with native earnings, satisfactory knowledge of the German language is not sufficient.

The above results indicate that, in contrast to the findings for other countries, there is no wage catch-up of foreign nationals in the German labor market. Moreover, the income gap between guest workers and German nationals continues to increase with the duration of stay, thus implying that there is not only no additional effort of migrants to catch up with native earnings, but overall human capital investment is even lower than that of the respective native worker. The empirical findings seem to support the hypotheses stated above: First, temporary migrants may be less willing to invest amounts into human capital sufficiently to catch up with native earnings. Secondly, guestworker migration to West Germany may be less selective as permanent migration to Australia, Canada or the United States. On the basis of the above results it is,

[21] Note that coefficients on the language variables measure differential effects, both compared with a poor knowledge of the German language.

however, not possible to specify whether both or only one hypothesis is responsible for the increasing earnings gap between migrants and natives. Using the subset of migrants alone, the hypothesis that a longer expected duration of stay positively influences human capital investment and, therefore, migrant's earnings, will be tested below. Since the duration of stay will, on average, be longer for the permanent migrant than for the temporary migrant, estimation results can be considered as a test of the hypothesis that temporary migrants do worse in any labor market, compared with permanent migrants, because their optimally chosen human capital investments are lower.

3.3 Immigrant Earnings, the Expected Duration of Stay and National Differences

Turning to an analysis of earnings of the subgroup of foreign nationals only, this section will, besides analyzing parameter differences using the subsamples on natives and immigrants, be particularly concerned with the effect of the expected duration of stay on country-specific human capital investment. Specifically, using data on the expected total duration of stay as described in section 3.1, the parameters on the $YSMSQ$-variable will be allowed to vary amongst individuals. Furthermore, estimation equations will be extended by allowing for variations in the YSM-variable amongst nationalities, thus analyzing which nationality has the greatest rate of returns on country-specific human capital investment.

3.3.1 Immigrants Absolute Earnings Development

The first two columns of table (5) present estimation results, using the subset of migrants alone. Comparing results in column (1) and (2) of table (5) with those in column (1) of table (4) reveals that the effect of both educational variables on migrant's earnings is found to be considerably smaller than on native's earnings, as was indicated by the results using the pooled sample. The variables schooling (SCH) and training ($TRAIN$) have approximately the same impact on immigrants' earnings. This, however, is not the case when German nationals are considered, where (SCH) has a 33% higher impact on earnings than does ($TRAIN$).

Being married has a higher impact on native incomes than on guest worker incomes. This may be due to the fact that, even if not married, guest workers often have obligations to relatives in the home country and are therefore forced to behave in a more responsible way than their German unmarried counterparts.

TABLE 5: Regression Analysis of Earnings of Foreign Nationals
(Dependent Variable: Natural Logarithm of Monthly Earnings)

VAR	(1)	(2)	(3)	(4)
CONSTANT	7.42	7.37	7.42	7.43
	(200.68)	(180.66)	(200.36)	(213.25)
EXP	0.0229	0.0229	0.0220	0.0235
	(7.42)	(7.47)	(7.04)	(7.79)
EXPSQ	-0.00050	-0.00047	-0.00047	-0.00047
	(-7.42)	(-7.12)	(-7.02)	(-7.07)
SCH	0.019	0.018	0.019	0.020
	(5.55)	(5.34)	(5.42)	(5.75)
TRAIN	0.017	0.017	0.18	0.018
	(4.72)	(4.52)	(4.65)	(4.91)
M	0.10	0.11	0.10	0.11
	(3.77)	(4.05)	(3.82)	(4.26)
YSM	0.0088	0.0072	0.0061	0.0087
	(3.03)	(2.44)	(2.02)	(3.25)
YSMSQ	-0.000097	-0.000082	-0.00012	
	(-2.43)	(-2.07)	(-3.06)	
L_2		0.045		
		(1.81)		
L_3		0.087		
		(3.44)		
YSMT			0.0014	
			(0.78)	
YSMJ			0.0050	
			(2.71)	
YSMG			0.0042	
			(2.37)	
YSMI			0.0053	
			(3.22)	
$\frac{YSMSQ}{TOT}$				-0.0076
				(-2.66)
$ADJ.R^2$	0.14	0.15	0.15	0.14

SOURCE: The Socio-Economic Panel, 1984

Note: t-ratios in parenthesis

The effect of the duration of residence in Germany on income is, as expected, positive and decreases over time. Although human capital investment is not sufficient to improve the earnings position of migrants relative to native workers, as shown above, country-specific human capital investment does have a significant positive impact on migrants absolute earnings position. Based on arrival point, an additional year of residence increases earnings by 0.86%. After 10 years in Germany, this number reduces to 0.67%. Adding dichotomous variables for language abilities as additional indicators of assimilation to the estimation equation only slightly decreases the coefficient of the YSM-variable. The results are similar to those found if using the pooled sample: guest workers with a satisfactory knowledge of the German language have earnings 4% higher than their colleagues with poor language knowledge. This income difference increases to 8.7% if the latter group is compared with guest workers with good or very good language knowledge. These considerable differences in income due to language ability indicate that even in the low-skilled or semi-skilled labor market language ability is thought to be correlated with productivity by German employers; it may also indicate that workers with knowledge of the German language are more capable of acquiring and using specific labor market information and, consequently, obtain better-paid jobs.

3.3.2 Earnings and the Expected Duration of Stay

As already indicated in section (2), the decision of an individual whether, and how much, to invest in human capital depends on the time horizon he considers as the pay-off period for a given investment. Assuming the absence of depreciation, for a given interest rate and rate of return, the investment will be smaller the smaller the remaining productive period. In the case of migrants, and defining a linear investment function for country-specific human capital investment, the resulting earnings equation indicates that the parameter on the quadratic term of residence in the host-county differs among individuals according to their expected total duration of stay.

Allowing the earnings profiles to vary among migrants with identical characteristics, but different expected durations of stay, requires the estimation of a regression equation with varying coefficients on the variable $YSMSQ$, as indicated by (8). The construction of the variable TOT, used as empirical specification of the variable θ in the above theoretical equation, is based on interview data. When the guest worker intends to return before reaching retirement age (which was assumed to be equal to 65) TOT is calculated as the sum of the expected total duration of stay and the years since migration; it is therefore equal to $TOTSTAY$ above. However, it is assumed that after an active working life no earnings-effective country specific human capital investment will take place. Therefore, when the migrant intends to either return after

retirement age or to stay forever, TOT was constructed by adding to the years since migration the difference between 65 and the age of the migrant.

Estimation results are given in column (4) of table (5). The numbers indicate that the expected duration of stay positively influences investment effort in country specific human capital and, therefore, the migrant's earnings position. After five years of residence, an additional year in the country will increase migrants earnings by 0.11% if the expected total duration of stay is ten years; this number increases to 0.49% if the migrant intends to stay for 20 years and to 0.86% if he expects to stay for 30 years. These results therefore strongly support the hypothesis, suggested by the above theoretical considerations, that the amount of investment made by temporary migrants in country-specific human capital depends positively on their expected length of stay in the host country. Since the length of stay of permanent migrants will generally be longer than that of temporary migrants, the results indicate that the poor assimilation of temporary migrants earnings to earnings of native workers, as it was found in this study and as it is in contrast to results of other studies analyzing earnings assimilation of permanent migrants, can be explained to some extend by a lower effort of investment into country specific human capital. This lower effort is due to a shorter pay off period of any investment undertaken.

3.3.3 National Differences

Column (3) of table (5) reports results after allowing for varying coefficients on the YSM-variable among different nationalities. Arguing that the rate of return on equal investment is higher for those who accumulated human capital in their home countries that is easily transferable to the needs of the host country, one would expect that those coming from countries with similar labor market requirements would have higher coefficients.[22]

The group excluded from the set of dummy variables are Spanish nationals. The variables $YSMi, i = T, J, G, I$ measure therefore the differential effect of an additional year of residence among Spanish nationals and Turkish, Jugoslavian, Greek and Italian nationals, respectively. This effect is insignificant between subgroups of Turkish and Spanish guest workers. Comparing the other subgroups with the reference group suggests that a year of residence increases earnings of Yugoslavian and Italian workers by 0.5% more than those of Spanish workers. If the groups start with equal initial

[22] Equation (8) implies that parameters on YSMSQ should also vary. However, empirical tests yield unreasonable results because of high collinearity. Therefore, only variations in the linear term will be considered.

incomes, then, after 15 years of residence, earnings of Italian and Jugoslavian workers will be 7.5% higher, and those of Greek workers will be 6.3% higher, than earnings of Spanish and Turkish nationals. These results are not surprising for the Turkish subgroup. A high percentage of Turkish guestworkers come from eastern Turkey with a prevailing agricultural economy. Thus one would expect the transferability of skills to the needs of the highly industrialized German economy to be lower than for Southern Europeans. However, it is surprising that Spanish guestworkers do relatively badly in the German labor market.

4 Summary and Conclusion

Empirical studies on earnings assimilation of permanent migrants to the USA, Canada and Australia have shown that the initial earnings gap between migrants and native workers steadily decreases over the time the migrant spends in the host country. The main explanations for the narrowing of this earnings gap between migrants and native workers are the high effort of migrants to invest into human capital and the positive selective character of migration.

This paper has shown that the effort of the migrant to invest into human capital specific to the labor market requirements of the host country positively depends on his expected total length of stay. Furthermore, migration will be positively selective only if certain labor market conditions are fulfilled in both, host- and source countries. In the case of temporary migration, the average total duration of stay will be shorter than in the case of permanent migration. This implies, according to the theoretical considerations, a lower effort of investment into human capital. Consequently, temporary migrants should do worse in the foreign labor market than permanent migrants. Moreover, in the case of temporary migration, labor market conditions in both countries are often likely to be unfavorable to positive selection, thereby reinforcing the weak position of these migrants in the host country labor market.

To test the hypotheses of low human capital investment and non selective migration in respect of temporary migration, monthly earnings of German and temporary foreign workers were analyzed using data from the first wave of the German socio-economic panel. The empirical results indicate that, unlike the findings for permanent migration to other countries, temporary foreign workers receive lower wages than their native counterparts throughout their working history in the host country, other things being equal. There is no earnings-crossover between these two groups. Moreover, the income gap between temporary workers and natives in the German labor market actually widens with the duration of stay.

Using data on the expected length of stay in the host country, empirical findings support the hypothesis that the total length of stay positively influences country-specific human capital investment and, therefore, earnings of migrants. Since the total length of stay of a permanent migrant will generally be longer than that of a temporary migrant, a lower effort to invest into human capital may be mainly responsible for the poor earnings assimilation of temporary migrants compared with that of permanent migrants.

Other findings are that language ability has a surprisingly high impact on narrowing the earnings differential between temporary workers and natives in the German labor market. Furthermore, using the subsample on migrants, it was found that Turkish and Spanish workers have the lowest rates of return on country-specific human capital investment, compared with Italian, Jugoslavian and Greek workers. These results may imply a lower transferability of human capital acquired in the home countries to the needs of the German labor market.

The results of this paper strongly suggest that it is important to carefully differentiate between permanent and temporary migration when considering the assimilation of migrants in the foreign labor market.

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